

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

| | | |
|--|---|---|
| To: LEE, Chul 1543-12, Seocho 3-dong, Seocho-gu, Seoul 137-073, Republic of KOREA | | Date of mailing <i>(day/month/year)</i> 23 MARCH 2001 (23.03.2001) |
| Applicant's or agent's file reference PCT-99033 | | IMPORTANT NOTIFICATION |
| International application No. PCT/KR99/00524 | International filing date <i>(day/month/year)</i> 07 SEPTEMBER 1999 (07.09.1999) | Priority date <i>(day/months/year)</i> 19 NOVEMBER 1998 (19.11.1998) |
| Applicant SK CORPORATION et al | | |

1. The applicant is hereby notified that International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**
 The applicant must enter the national phase before each elected office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

 Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

 For further details in the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

| | |
|---|--|
| Name and mailing address of the IPEA KR Korean Industrial Property Office Government Complex-Taejon, Dunsan-dong, So-ku, Taejon Metropolitan City 302-701, Republic of Korea Facsimile No. 82-42-472-7140 | Authorized officer COMMISSIONER Telephone No. 82-42-481-5210 |
|---|--|



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| | | | |
|---|--|---|---|
| Applicant's or agent's file reference PCT-99033 | FOR FURTHER ACTION | | See Notification of Transmittal of International Preliminary Examination Report (Form PCT IPEA 416) |
| International application No. PCT/KR99/00524 | International filing date (day/month/year) 07 SEPTEMBER 1999 (07.09.1999) | Priority date (day/month/year) 19 NOVEMBER 1998 (19.11.1998) | |
| International Patent Classification (IPC) or national classification and IPC IPC7 H01M 8/06, C01B 3/22, C01B 3/50 | | | |
| Applicant SK CORPORATION et al | | | |

| | |
|----|---|
| 1. | This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36. |
| 2. | <p>This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of _____ sheets.</p> |
| 3. | <p>This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application |

| | |
|---|--|
| Date of submission of the demand 02 MAY 2000 (02.05.2000) | Date of completion of this report 12 MARCH 2001 (12.03.2001) |
| Name and mailing address of the IPEA KR Korean Industrial Property Office Government Complex-Taejon, Dunsan-dong, So-ku, Taejon Metropolitan City 302-701, Republic of Korea Facsimile No. 82-42-472-7140 | Authorized officer YANG, In Soo Telephone No. 82-42-481-5782 |



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT KR99 00524

I Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement) under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide** and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet _____

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION

International application No.

PCT KR99 00524

V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|-------|-----|
| Novelty (N) | Claims | 1 - 8 | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | 1 - 8 | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | 1 - 8 | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

The closest prior art is represented by EP-A-600621 and EP-A-615949. These documents do not disclose, however, a fuel reformer utilizing a metal thin film for use in a fuel cell driven mobile vehicle.

Consequently Claims 1 to 8 are novel(Article 33(2) PCT).

The state of the art does not give any hints to combine the teachings of these or other documents, so as to arrive at the teachings of the subject-matter defined in the claims.

Advantages of the claimed invention are avoiding problems related to the concentration of CO and the total size of the fuel reformer system(e.g. low concentration of CO, decrease of the total size, and others), and applied to the specific system mentioned in claim 1 to 8.

The subject-matter of Claims 1 to 8 not being rendered obvious by the state of the art, these claims also meet the requirements of Article 33 (3) PCT (inventive step)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/KR 99/00524

| Patent document cited in search report | | | Publication date | Patent family member(s) | | | Publication date |
|---|----|----------|---------------------|----------------------------|----|----------|---------------------|
| EP | A1 | 600621 | 08-06-1994 | CA | AA | 2109655 | 03-06-1994 |
| EP | B1 | 600621 | 16-04-1997 | DE | C0 | 69309862 | 22-05-1997 |
| | | | | DE | T2 | 69309862 | 24-07-1997 |
| | | | | GB | A0 | 9225188 | 20-01-1993 |
| | | | | JP | A2 | 6239601 | 30-08-1994 |
| | | | | US | A | 5458857 | 17-10-1995 |
| WO | A1 | 9813125 | 02-04-1998 | US | A | 5888273 | 30-03-1999 |
| EP | A2 | 924162 | 23-06-1999 | DE | A1 | 19755813 | 01-07-1999 |
| EP | A3 | 924162 | 20-10-1999 | EP | A2 | 924161 | 23-06-1999 |
| | | | | EP | A3 | 924161 | 13-10-1999 |
| | | | | DE | A1 | 19757506 | 01-07-1999 |
| WO | A1 | 9919456 | 22-04-1999 | AU | A1 | 10849/99 | 03-05-1999 |
| WO | C1 | 9919456 | 03-06-1999 | EP | A1 | 951529 | 27-10-1999 |
| US | A | 5861137 | 19-01-1999 | | | none | |
| EP | A2 | 615949 | 21-09-1994 | CA | AA | 2118956 | 17-09-1994 |
| EP | A3 | 615949 | 09-11-1994 | CA | C | 2118956 | 25-08-1998 |
| EP | B1 | 615949 | 15-09-1999 | DE | C0 | 69420604 | 21-10-1999 |
| | | | | JP | A2 | 6263402 | 20-09-1994 |
| | | | | US | A | 5639431 | 17-06-1997 |
| | | | | JP | A2 | 6263404 | 20-09-1994 |
| | | | | JP | A2 | 6263403 | 20-09-1994 |
| | | | | JP | A2 | 6263405 | 20-09-1994 |
| | | | | JP | A2 | 7109104 | 25-04-1995 |
| | | | | JP | A2 | 7109106 | 25-04-1995 |
| | | | | JP | A2 | 7109105 | 25-04-1995 |
| DE | C1 | 19738513 | 05-11-1998 | EP | A2 | 908536 | 14-04-1999 |
| JP | A2 | 8321321 | 03-12-1996 | | | none | |
| JP | A2 | 6168733 | 14-06-1994 | JP | B2 | 2955040 | 04-10-1999 |
| JP | A2 | 5155602 | 22-06-1993 | | | none | |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00524

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁷: H 01 M 8/06; C 01 B 3/22, 3/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁷: H 01 M 8/00; C 01 B 3/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AT, Chem. Abstr

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-WPI, Questel-CAS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | EP 0600621 A (Rolls Royce) 08 June 1994 (08.06.94) cited in the application. | 1-8 |
| A | WO 98/13125 A1 (Buxbaum) 02 April 1998 (02.04.98) cited in the application. | 1-8 |
| P,A | EP 0924162 A (DBB Fuel Cell) 23 June 1999 (23.06.99). | 1-8 |
| P,A | WO 99/19456 A (Northwest Power) 22 April 1999 (22.04.99). | 1-8 |
| P,A | US 5861137 A (Edmund) 19 January 1999 (19.01.99) | 1-8 |
| A | EP 0615949 A (Mitsubishi Heavy Ind) 21 September 1994 (21.09.94). | 1-8 |
| A | DE 19738513 A1 (DBB-Fuel Cell Engines) 05 November 1998 (05.11.98). | 1-8 |

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
 „A“ document defining the general state of the art which is not considered to be of particular relevance
 „E“ earlier application or patent but published on or after the international filing date
 „L“ document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 „O“ document referring to an oral disclosure, use, exhibition or other means
 „P“ document published prior to the international filing date but later than the priority date claimed
 „T“ later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 „X“ document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 „Y“ document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
 „&“ document member of the same patent family

Date of the actual completion of the international search

11 November 1999 (11.11.99)

Date of mailing of the international search report

22 December 1999 (22.12.99)

Name and mailing address of the ISA/AT
Austrian Patent Office
Kohlmarkt 8-10; A-1014 Vienna
Facsimile No. 1/53424/200

Authorized officer

Hammer

Telephone No. 1/53424/374

INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR 99/00524

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| A | JP 08-321321 A (TOKYO GAS CO et al) (abstract) 03 December 1996 (03.12.96). In: Patent Abstract of Japan [CD-ROM]. | 1-8 |
| A | JP 06-168733 A (MITSUBISHI HEAVY IND Ltd) (abstract) 14 June 1994 (14.06.94). In: Patent Abstract of Japan [CD-ROM]. | 1-8 |
| A | JP 05-155602 (SEKIYU SANGYO) Patent Abstracts of Japan, Vol. 17, Number 551 (C1117), 05 October 1993 (05.10.93) (abstract). | 1-8 |